

CERTIFICATE OF MAILING

I hereby certify that this document is being deposited with the United States Postal Service as Express Mail addressed to:  
Mail Stop Patent Application, Commissioner For Patents,  
P.O. Box 1450, Alexandria, VA 22313-1450 on the date set forth below.

Betty J. Borger  
(signature)

Express Mail No. EL 964024185 US

Date of signature and deposit January 29, 2004

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
SCOTT WOODWARD BENNETT, et al.	)	Group Art Unit
	)	
Serial No.	)	
	)	Examiner
Filed: Herewith	)	
	)	
For: HYDRAULIC PISTON MADE FROM	)	Attorney Docket 1-25009
ROLLED SHEET METAL, METHOD	)	
FOR ITS MANUFACTURE AND	)	
INTERMEDIATE PRODUCT OF	)	
THE METHOD	)	

\_\_\_\_\_  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

TRANSMITTAL OF VERIFIED ENGLISH TRANSLATION OF  
PRIORITY APPLICATION NEW CLAIMS

Honorable Sir:

Attached please find a verified English translation of priority application new claims for Application No. PCT/EP02/08887.

Respectfully submitted,

Douglas W. Pavelko  
Reg. No. 36,888

MacMillan, Sobanski & Todd, LLC  
One Maritime Plaza, Fourth Floor  
720 Water Street  
Toledo, Ohio 43604  
(419) 255-5900

V E R I F I C A T I O N

I, Madgie Vintin, BA., MITI., translator to Taylor & Meyer of 20 Kingsmead Road, London, SW2 3JD, hereby declare that I am the translator of the documents attached, and certify that the following is a true translation, to the best of my knowledge and belief.

*Madgie Vintin*

\_\_\_\_\_  
(translator)

\_\_\_\_\_  
(date)

## Claims

1. Cup-shaped hydraulic piston (10) made from rolled sheet metal, comprising
  - 5 - an open end (12),
  - a side wall (16) with a cylindrical outer surface (18) and an inner surface (22), wherein the side wall (16) at its outer surface (18) is provided with an annular groove (20) in a portion adjoining the open
  - 10 end (12), and
  - a piston head (14),wherein a portion (24) of the inner surface (22) of the side wall (16) adjoining the open end (12) and extending in axial direction over the annular groove
- 15 (20) has a cylindrical shape, and wherein the thickness of the side wall (16) decreases monotonically from the portion (24) of the inner surface (22) up to the piston head (14).
- 20 2. Hydraulic piston according to claim 1, characterized in that the piston head (14) is curved inwards.
3. Hydraulic piston according to claim 2,
- 25 characterized in that the piston head (14) is curved in a concave manner.
4. Hydraulic piston according to claim 2,
- 30 characterized in that the radially outer part of the piston head (14) has the shape of a truncated cone and the central part of the piston head (14) has the shape of a spherical cap.

5. Hydraulic piston according to claim 4,  
characterized in that the extension of the truncated-  
cone-shaped part of the piston head (14) along its  
profile is not greater than three times the wall  
5 thickness of the side wall (16) in its portion  
adjoining the piston head (14).
6. Method of manufacturing a hydraulic piston according  
to one of the preceding claims, comprising the steps:  
10 - punching a disk-shaped round blank out of a piece of  
rolled sheet metal,  
- deep-drawing the disk-shaped round blank into a cup  
shape by means of a bottom die and a punch,  
- stamping the cup-shaped blank to form the piston  
15 head and the cylindrical outer surface of the  
hydraulic piston, and  
- incorporating an annular groove into the outer  
surface of the hydraulic piston.
- 20 7. Method according to claim 6,  
characterized in that the disk-shaped round blank  
during deep-drawing into a cup shape is pressed  
firstly by means of a first punch through a first  
circular die opening and then by means of a second  
25 punch through a second circular die opening, the  
diameter of which is smaller than the diameter of the  
first die opening.
8. Method according to claim 7,  
30 characterized in that the first punch and the second  
punch are cylindrical.

9. Method according to claim 7 or 8,  
characterized in that the cup-shaped blank is pressed  
by means of a third punch through a third circular die  
opening, the diameter of which is smaller than the  
5 diameter of the second die opening, wherein the third  
punch has a first cylindrical portion emanating from  
its free end and adjoined by a second cylindrical  
portion, the diameter of which is greater than the  
diameter of the first cylindrical portion and smaller  
10 than the diameter of the third die opening, in order  
to form a step in the side wall at the open end of the  
blank.
10. Method according to claim 9,  
15 characterized in that subsequent to deep-drawing into  
a cup shape a first stamping operation is effected to  
form an inwardly curved piston head in that a step-  
shaped punch comes into engagement with the step in  
the side wall of the blank and presses the blank into  
20 a bottom forming die.
11. Method according to claim 10,  
characterized in that subsequent to the first stamping  
operation the cup-shaped blank is pressed by means of  
25 a step-shaped punch, which comes into engagement with  
the step in the side wall of the blank, through a  
fourth circular die opening, the diameter of which is  
smaller than the diameter of the third die opening, in  
order to form the cylindrical outer surface of the  
30 side wall.

12. Method according to claim 11,  
characterized in that subsequent to forming of the  
cylindrical outer surface of the side wall a second  
stamping operation is effected by means of a bottom  
forming die and a step-shaped punch, which comes into  
engagement with the step in the side wall of the  
blank, in order to form a transition region between  
the piston head and the side wall.
- 10 13. Method according to claim 12,  
characterized in that the region of the bottom die  
touching the piston head is cap-shaped in the centre  
and truncated-cone-shaped at the edge.
- 15 14. Method according to claim 12 or 13,  
characterized in that subsequent to forming of the  
transition region between the piston head and the side  
wall a third stamping operation is effected by means  
of a bottom forming die and a step-shaped punch, which  
comes into engagement with the step in the side wall  
of the blank, in order to form the final configuration  
of the piston head.
- 20
15. Method according to one of claims 6 to 14,  
characterized in that subsequent to forming of the  
annular groove at least the outer surface is  
subsequently machined, wherein the subsequent  
machining comprises at least one of the following  
steps:
- 30
- grinding;
  - coating, and
  - polishing.